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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR  | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/045,318      | 11/09/2001  | Stephen P. DeOrnellas | TEGL-01082US3       | 3120             |

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EXAMINER

UMEZ ERONINI, LYNETTE T

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

1765

DATE MAILED: 05/22/2002

4

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/045,318

Applicant(s)

DEORNELLAS ET AL.

Examiner

Lynette T. Umez-Eronini

Art Unit

1765

-- Th MAILING DATE of this communication app ars on the cover sheet with the correspond nce address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_ .
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 42-50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 42-50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_ .
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_ .
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_ .
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_ .

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Nakagawa teaches a method for etching a pattern on a workpiece, comprising:

forming a groove through a layer formed on a substrate (workpiece) and exposing a portion of the SiN layer using Ti film (a reactive metal that is the same as applicant's hard mask) **6** mask (column 1, lines 29-31; column 2, lines 5-7 and 13-15, **FIG. 1(a)** and **FIG.1(c)**), wherein the groove has a width (critical dimension) substantially equal to the width of the SiN area which was not covered with the Ti film **6** (column 2, lines 34-36), reads on,

selecting a workpiece with a hard mask deposited over a layer to be etched, which hard mask is comprised of a reactive metal the hard mask further defining a pattern including at least one portion having a critical dimension; and

performing reactive ion etching with the Ti mask and etching the SiN layer, and forming a groove **7** that has a width (same as applicant critical dimension) substantially equal to the width of the SiN area which was not covered with the Ti film **6** (column 2, lines 28-36 and **FIG.1(c)**), reads on,

processing the workpiece in a reactor by exposing the entire hard mask to an etch, whereby the layer is etched corresponding to the pattern of the hard mask, and

Art Unit: 1765

the growth of the layer during the etch is minimized in the portion of the layer corresponding to the critical dimension (column 2, lines 27-39 and 34-36).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa ('288) in view of Hashimoto (US 5,320,979).

Nakagawa differs in failing to teach exposing the hard mask to a stream of oxidizing gas in the reactor prior to or during said etch step in order to oxidize the surface of the hard mask and thereby slow down an etch rate of the hard mask, **in claim 50.**

Hashimoto teaches oxidizing a metal surface with oxygen in a bias ECR etching apparatus results in the metal not being etched, which reads on exposing the hard mask to a stream of oxidizing gas in the reactor prior to or during said etch step in order to oxidize the surface of the hard mask and thereby slow down an etch rate of the hard mask.


It would have been obvious to one having ordinary skill in the art to modify Nakagawa by using the method of oxidizing a hard mask layer as taught by Hashimoto

Art Unit: 1765

for the purpose of increasing the etch resistance of the mask material by decreasing its etching rate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner can normally be reached on First Friday.

ltue  
May 20, 2002

  
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SUPERVISORY PATENT EXAMINER  
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